

**REMARKS**

Claims 22-37 are presently pending in this application. Claims 22-25, 27-29, 31-33, 35-37 have been amended to more particularly define the claimed invention.

It is noted that the amendments are made only to more particularly define the invention and not for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability. It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Applicant gratefully acknowledges the Examiner's indication that claims 23-25 and 29-37 have been allowed over the prior art of record. However, Applicant submits that all of the claims are allowable.

The Specification is objected to due to an alleged informality. The Office Action requests that "81" of page 9, line 16 be changed to "18." Applicants' amendment of October 17, 2005 previously corrected this typographical error on page 2, "AMENDMENTS TO THE SPECIFICATION:". Applicants respectfully request that the Examiner reconsider and withdraw the objection in light of the previously filed amendment.

Applicants have amended claims 22-24 and 37 to correct the antecedent basis for the element "central lines" by deleting the preceding term, "the".

Applicants have amended claims 22, 23 and 37 to correct the antecedent basis for the element "a second pressure generating chamber" by reciting "the second pressure generating chamber."

Applicants have amended claim 23 to correct an antecedent basis problem by reciting,

“wherein ~~the~~ a rigidity of a partition wall between the adjacent nozzles and ~~the~~ a communication flow passage is smaller than ~~the~~ a rigidity of a partition wall between the adjacent pressure generating chambers.”

Applicants have amended claims 24 and 37 to correct an antecedent basis problem by reciting, “wherein ~~the~~ a total number of nozzles N, ~~the~~ a distance between nozzles Np (inch), ~~the~~ a printing resolution Dp (dots/inch), and ~~the~~ a width of the line scan head Wh (inch) satisfy following formula...”

With respect the Office Action’s request for a definition of the term “A” in the formula of claim 24 and 27, i.e., “ $Wh < \sin\{\text{ACOS}(Np/Dp)\} \times \{(1/Dp) \times (N-1) + 1/Np\}$ ,” Applicants provide the following explanation: ACOS is the inverse of COS, or otherwise written as  $1/\text{COS}$  or  $\text{COS}^{-1}$ . Referring to Fig. 8,  $\theta$  is defined as ACOS of Np, the hypotenuse (H), over Dp, the adjacent leg (A). Where,  $\theta = \text{COS}(A/H) = \text{ACOS}(H/A)$ . Applicant submits that the term “ACOS” is commonly used and therefore, the term does not need to be defined in the claims.

Applicants have amended claim 25, 29 and 33 to correct an antecedent basis problem by replacing, “the distance” with “a distance”. Claims 22 and 26-28 stand rejected under 35 U.S.C. §102(b) as being unpatentable over Toyoji et al. (JP 08-011304).

This rejection is respectfully traversed in view of the following discussion.

## **I. APPLICANT’S CLAIMED INVENTION**

The claimed invention (as defined, for example, by independent claim 1) is directed to a recording head including a nozzle plate having nozzles for discharging ink droplets arranged in a row, a plurality of pressure generating chambers including a first pressure

generating chamber and a second pressure generating chamber communicating to the nozzles, a diaphragm formed on one face of the pressure generating chamber, a piezoelectric element for displacing the diaphragm. The first pressure generating chamber is disposed on one side of the nozzles arranged in the row, and a plurality of second pressure generating chambers are disposed on the other side, and the first and second pressure generating chambers are opposed to each other across the nozzles arranged in the row so that central lines of the first and second pressure generating chambers are almost coincident. A communication flow passage leads from the plurality of pressure generating chambers to the nozzles. The width of one of the first and the pressure generating chambers is defined by two side wall faces, and a portion of the communication flow passage is located outside the width of the pressure generating chamber.

Conventionally, packaging inkjet nozzles of the recording head at high density to increase the number of nozzles is necessary to enhance the workability and the operability of assembling. However, when the number of parts or aligning positions is increased, the precision is lowered, making it difficult to fabricate the high quality inkjet recording head stably. The structure in which a plurality of row of nozzles are arranged on one plate to attain a higher packaging density has a problem that a group of vibrators are required for each row of nozzles, and there are a number of aligning positions, resulting in the bad workability and the higher cost. Also, since the printing occurs only in the direction along which the plurality of rows of nozzles are arranged, the line recording apparatus of head fixed type has only a packaging structure in which the heads are arranged in staggered form. Also, it is difficult to avoid a problem that the area of head portion is so large that a head preservation portion or the entire apparatus is increased in size. (Application at page 3, line 22 to page 4, line 14).

The claimed invention (e.g., as recited in claim 1), on the other hand, includes *a communication flow passage leading from the plurality of pressure generating chambers to the nozzles, wherein a width of one of the first and second pressure generating chambers is defined by two side wall faces, and wherein a portion of the communication flow passage is located outside the width of the pressure generating chamber.* (Specification, for example, starting at page 11, line 18.)

## II. THE ALLEGED PRIOR ART REJECTIONS

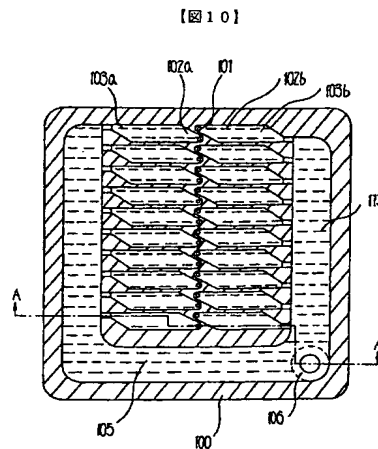
### 35 U.S.C. § 102(b) Rejection over Toyoji et al. (JP 08-011304)

The Examiner alleges that Toyoji et al. (JP 08-011304), (Toyoji), teaches the invention of claims 22 and 26-28. Applicant submits, however, that Toyoji does not teach or suggest each and every element and feature of the claimed invention.

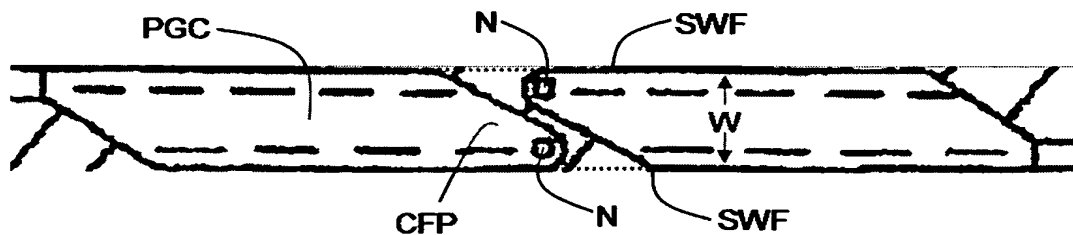
Applicant submits that Toyoji fails to teach or suggest Applicants' claim 1 recitation of, "...wherein a width of one of the first and second pressure generating chambers is defined by two side wall faces, and wherein a portion of the communication flow passage is located outside the width of one of the first and second pressure generating chambers."

The Examiner states that Toyoji teaches "a part of the passage is outside of the chamber wall." However, there is no explanation in the Office Action as to how this specific recitation of Applicants' claim language is allegedly anticipated by Toyoji. Applicants have amended the claim language to further clarify the invention by reciting a width of one of the first and second pressure generating chambers defined by two side walls, and wherein a portion of the communication flow passage is located outside that defined width of the first or second pressure generating chambers.

Toyoji teaches a plurality of pressure generating chambers 103a and 103b having a flow passage to a nozzle in Fig. 10. See Fig. 10 below.



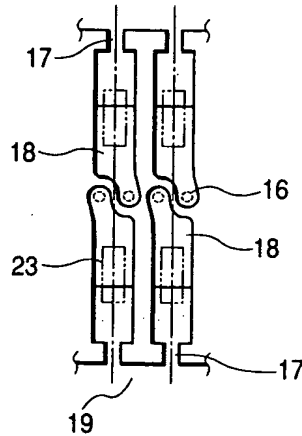
A portion of a pair of pressure generating chambers (PGC) face oppositely from each other, see below. A communication flow passage (CFP) leads from the PGC to a nozzle (N). The width W of the PGC is defined by two oppositely bounding side wall faces (SWF). A dotted line below represents the projection of width W of the PGC across the CFP and the nozzles N. As shown, it is clear that the communication flow passage CFP is never larger than the width W of the pressure generating chambers PGC. The communication flow passage CFP is clearly bounded within the width W of the pressure generating chambers PGC.



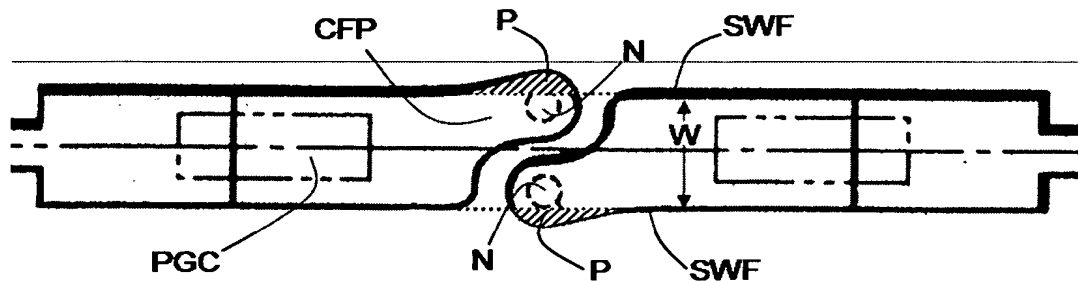
Applicants' Fig. 6 discloses an exemplary aspect of the present invention which

includes pressure generating chambers 23 having a communicating flow passage 18 to a discharge nozzle 16.

**FIG. 6**



In this exemplary aspect, a portion of a pair of pressure generating chambers (PGC) face oppositely from each other, see below. A communication flow passage (CFP) leads from the PGC to a nozzle (N). The width  $W$  of the PGC is defined by two oppositely bounding side wall faces (SWF). A dotted line below represents the projection of the width  $W$  of the PGC across the CFP and the nozzles  $N$ . It is clearly disclosed that the communication flow passage CFP is larger than the width  $W$  of the pressure generating chambers PGC, and consequently, a portion  $P$  (at area of cross-hatching) of the communication flow passage CFP is outside of the width  $W$  of the pressure generating chambers PGC.



Therefore, Applicants submit that Toyoji fails to teach or suggest Applicants' claim 1 recitation of, "...wherein a width of one of the first and second pressure generating chambers is defined by two side wall faces, and wherein a portion of the communication flow passage is located outside the width of the pressure generating chamber."

Therefore, Applicants respectfully request the Examiner reconsider and withdraw the rejection of independent claims 22 and dependent claims 26-28. Therefore, Applicant respectfully requests Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

### III. FORMAL MATTERS AND CONCLUSION

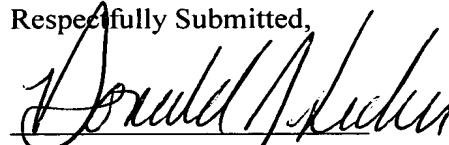
In view of the foregoing, Applicant submits that claims 22-37, the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

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Respectfully Submitted,



Donald J. Lecher, Esq.

Reg. No. 41,933

Sean M. McGinn, Esq.

Reg. No. 34,386

**McGinn Intellectual Property Law Group, PLLC**  
8321 Old Courthouse Rd., Suite 200  
Vienna, Virginia 2218  
(703) 761-4100  
**Customer No. 21254**